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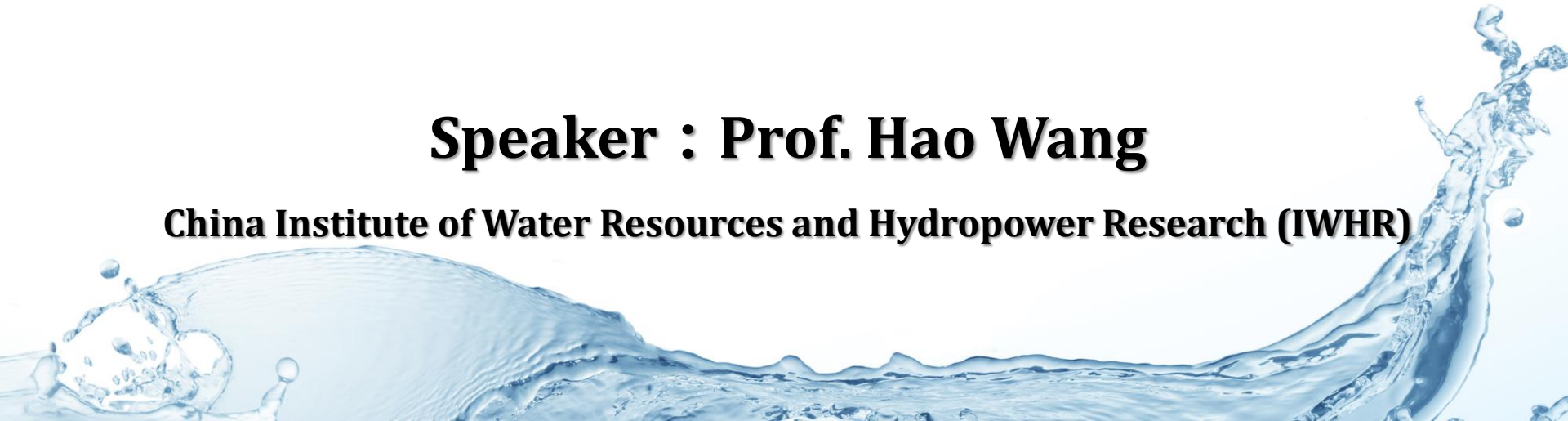
INTEGRATED WATER MANAGEMENT IN THE 21ST CENTURY:
ADDRESSING IMMINENT CHALLENGES



Flood and drought disaster prevention and response in China

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China Institute of Water Resources and Hydropower Research (IWHR)



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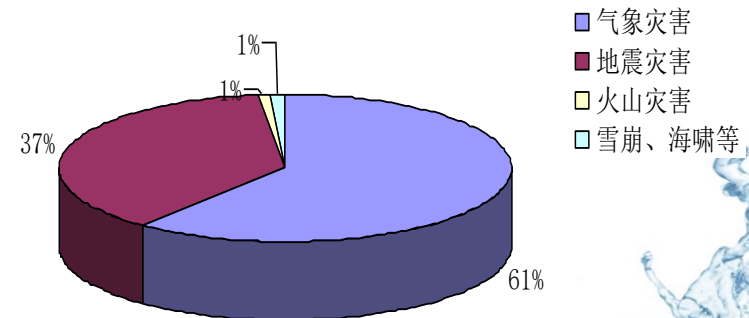


- I. Current situation and new situation of flood and drought**
- II. Flood and drought disaster response status and difference**
- III. Flood and drought disaster response strategies and actions**



I. Current situation and new situation of flood and drought

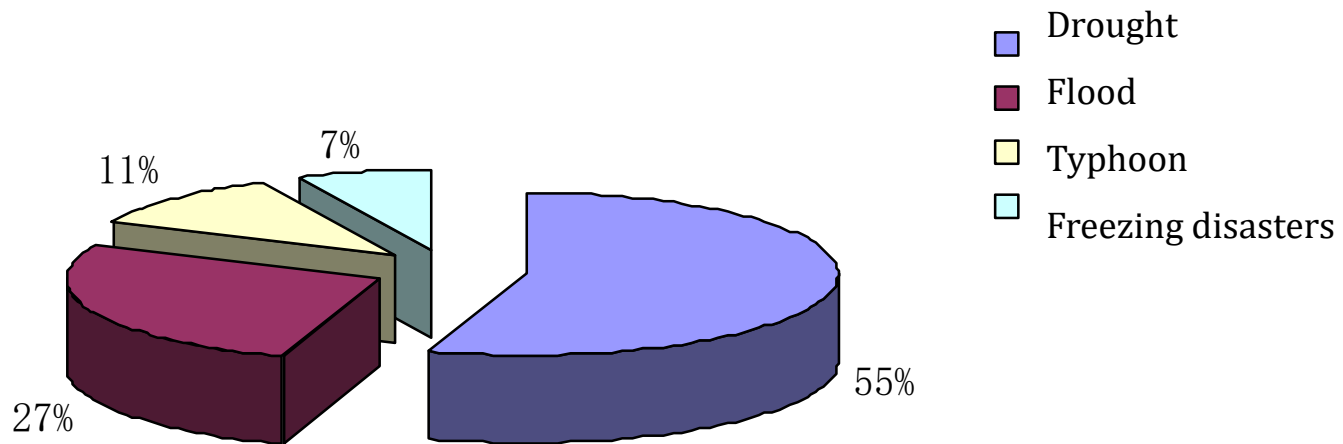
- ✓ 61% of the deaths from natural disasters worldwide are caused by meteorological disasters.
- ✓ China's meteorological disaster losses accounted for 71% of all natural disaster losses.



The number of deaths from natural disasters worldwide as a percentage of total deaths

I. Current situation and new situation of flood and drought

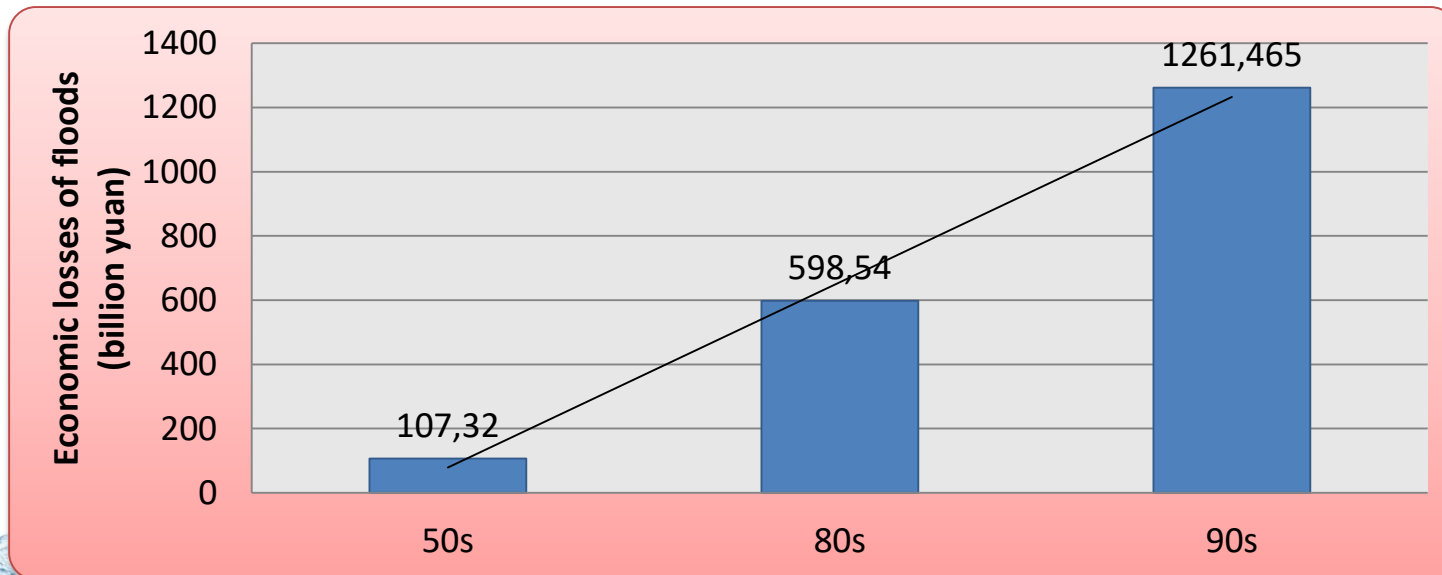
- ✓ China's flood and drought disasters accounted for 81% of meteorological disaster losses, accounting for 82% of the stricken area, making the **two most important natural disasters.**



The area affected by various meteorological disasters in China as a percentage of the total affected area

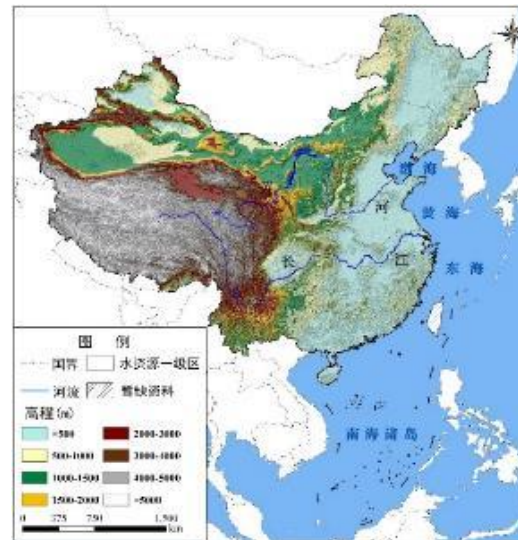
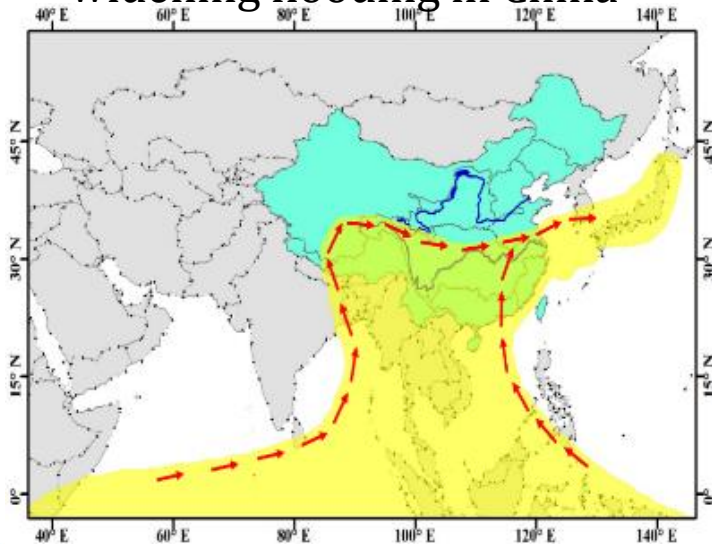
I. Current situation and new situation of flood and drought

The economic losses of floods are increasing: in the 1950s, the total loss of China's flood economy was 107.32 billion yuan, an increase of 4.58 times in the 1980s, and an increase of 1.11 times in the 1990s compared with the 1980s. The economic losses of floods in 1998 was 2.4 times that of the 1950s



I. Current situation and new situation of flood and drought

- Natural and geographical conditions determine that China is a country with frequent flood and drought disasters
- ✓ **Monsoon climate:** Most of China is affected by the southeast and southwest monsoons, forming the basic characteristics of southeast rainy and northwest drought.
- ✓ **The underlying surfaces are highly clustered:** the three-step ladder-like landform pattern fundamentally determines the basic background of frequent and widening flooding in China



- 第一阶梯 平均海拔大于4000m, 以高原为主, 湖泊多, 人口少, 河源地区
- 第二阶梯 海拔1000-2000m, 山地、盆地相间分布, 局部人口集中
- 第三阶梯 海拔500m以下, 平原为主, 季风强烈, 河湖众多, 人口密集

I. Current situation and new situation of flood and drought

- The new flood and drought issues highlighted under the influence of climate change
 - ✓ With the deepening of urban expansion and the impact of climate change, the problem of urban inland inundation has intensified.
 - ✓ The number of deaths from mountain torrents is decreasing, but the proportion of total deaths from floods has increased, accounting for 73.6% since the 21st century.
 - ✓ The flood and drought sharp turn events has gradually emerged frequently.
 - ✓ With the initial flood control of the major rivers, the drought, especially the agricultural drought, has become more prominent.
 - ✓ The economic losses caused by storm surges in coastal areas are increasing every year.
 - ✓ The frequency of snowmelt and ice melting floods increased significantly.

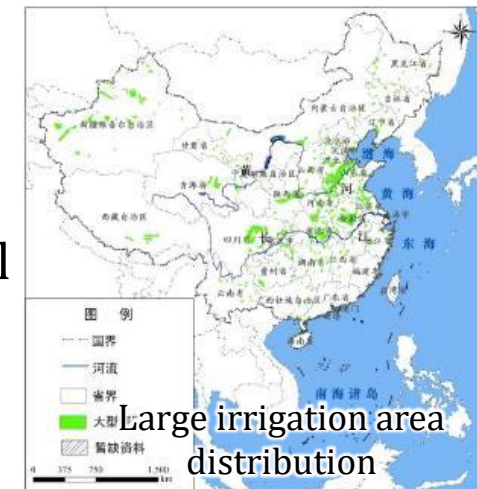
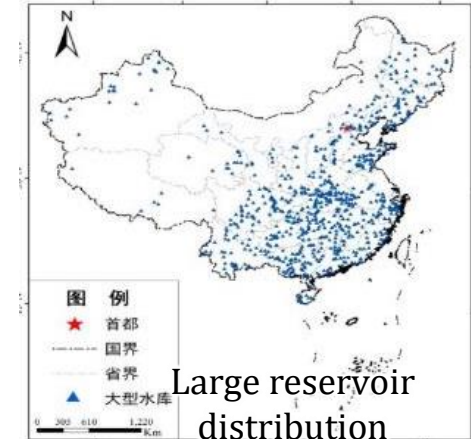


II. Flood and drought disaster response status and difference



■ Flood and drought disaster response status

- The national key regional engineering system is gradually improving
- National drought-resistant top design is further optimized
- The framework of the Major River Flood Control System was initially completed.
- New explorations in urban inland inundation governance
- Mountain torrents disaster prevention and control has been further strengthened



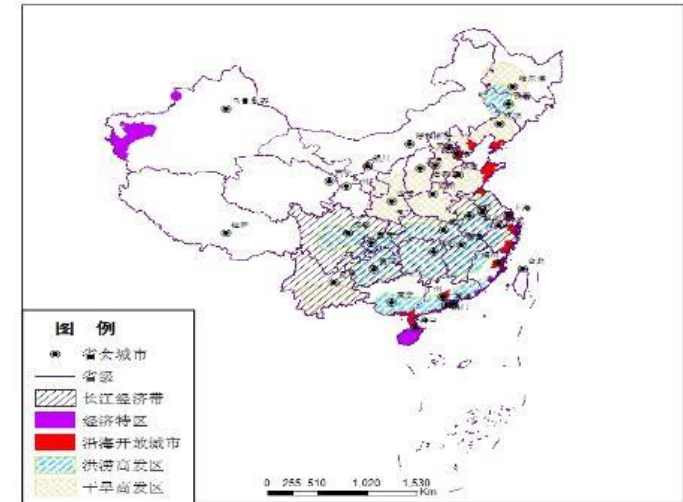
II. Flood and drought disaster response status and difference



Flood and drought disaster response difference

- Socioeconomic layout and urbanization have not effectively avoided the risk of flood and drought
- The response to flood and drought disasters is not fully integrated its rules of development
- Engineering system can not meet the flood disaster response needs
- Early warning and emergency response capabilities are seriously inadequate
- Insufficient support for disaster prevention and scientific disaster prevention

Distribution of high-risk areas and key economic zones in China

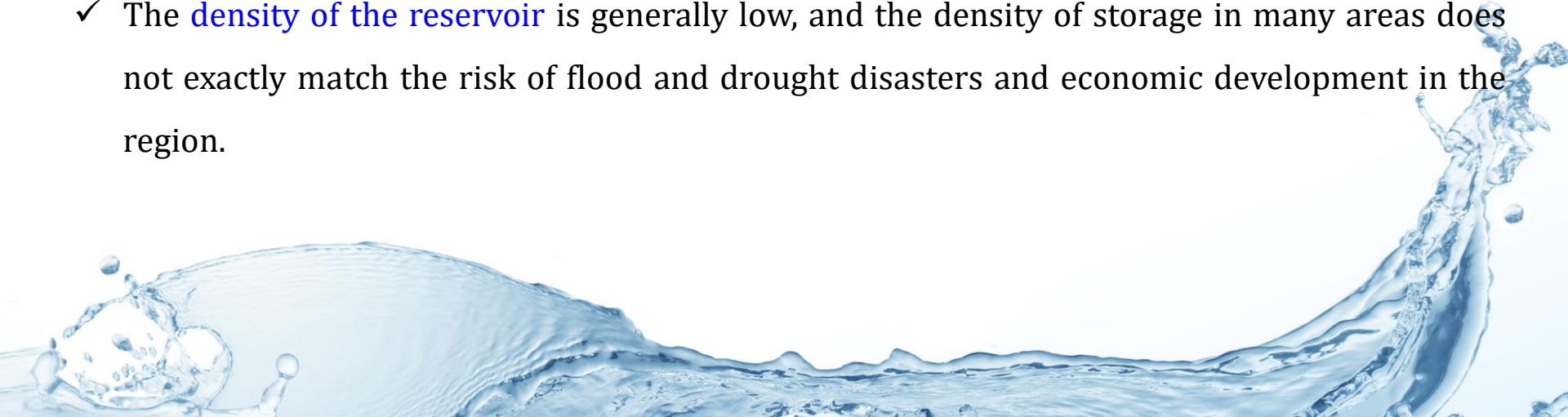


II. Flood and drought disaster response status and difference



■ Engineering system can not meet the flood disaster response needs

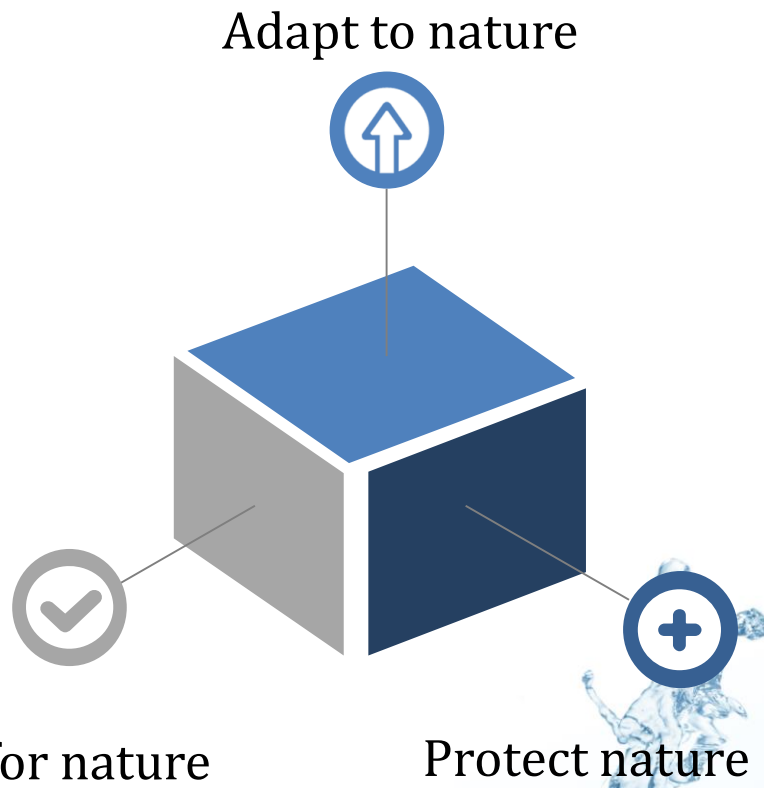
- ✓ The overall **storage capacity** is relatively low, and China's per capita storage capacity is only **571m³/person**, which is only about **20%** of the per capita storage capacity of the world's major water conservancy countries.
- ✓ The river **runoff control capacity** of the world average reservoir is about **40%** of the total water resources, and the developed countries reach more than **60%**; while the average runoff control capacity of the Chinese reservoir is only **25%**.
- ✓ The **density of the reservoir** is generally low, and the density of storage in many areas does not exactly match the risk of flood and drought disasters and economic development in the region.



III. Flood and drought disaster response strategies and actions



- **General principle**
- **Follow the laws of nature**
- **Rule of law led by the government**
- **Systemic and foresighted design**
- **Giving full play to advantages**
- **Protect and improve livelihoods**

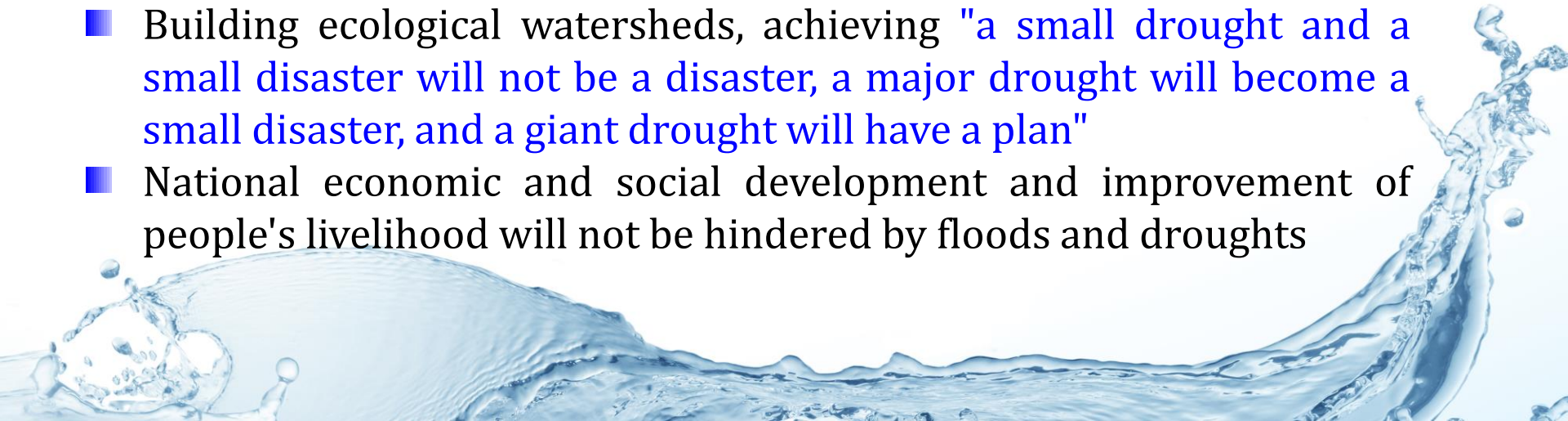


III. Flood and drought disaster response strategies and actions



■ Overall objective

- Integrate flood and drought disaster response into national economic and social development and ecological civilization construction
- Building a multi-level, multi-process, multi-subject linkage of the flood and drought disaster response system
- Constructing Engineering System and Management System for Flood and Drought Disaster Response to China's National Conditions
- Building ecological watersheds, achieving "a small drought and a small disaster will not be a disaster, a major drought will become a small disaster, and a giant drought will have a plan"
- National economic and social development and improvement of people's livelihood will not be hindered by floods and droughts



III. Flood and drought disaster response strategies and actions



■ Coping action

Active adaptation

Optimize the spatial layout of social and economic development by combining water and drought risk zoning
Strengthen water conservation in agriculture and animal husbandry, and improve the current yield of cultivated land
Strengthen the research on the mechanism of mountain flood disasters and scientifically avoid the risk of mountain flood

Orderly response

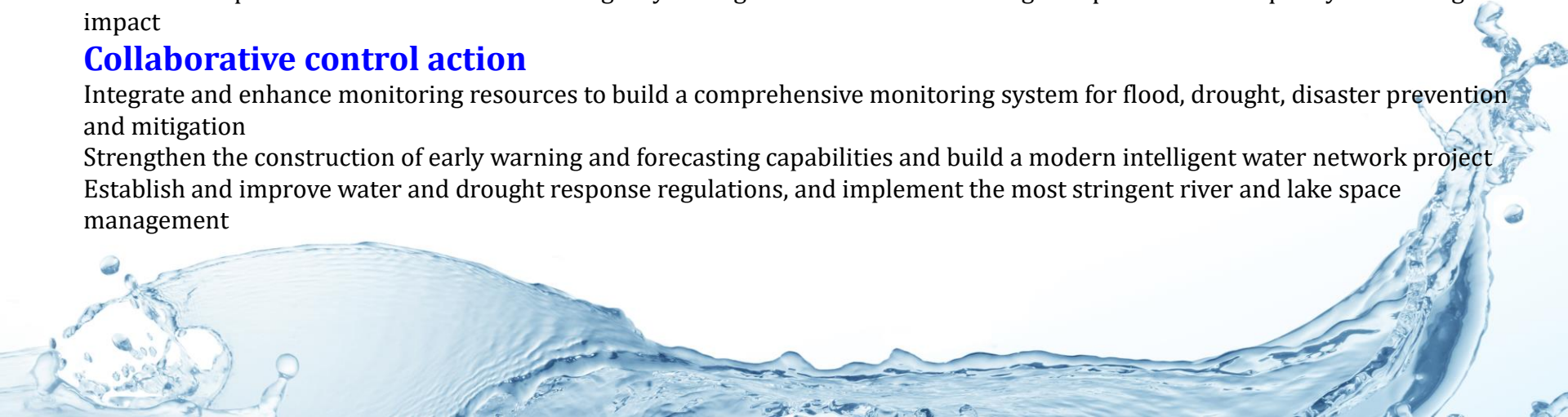
Optimize the layout of water conservancy projects and improve the ability of the project to cope with water and drought
Optimize emergency water source allocation and scientifically construct soil and underground reservoirs

Process regulation action

Optimize the ecological construction of the source area of the river and improve the natural adjustment ability of water and drought
Constructing slope production and storage system to overcome the shortcomings of traditional flood prevention and control
Expand the city's three-dimensional water space and tear off the "city to see the sea" business card
Promote risk prevention and control and emergency management of water and drought impacts on water quality and ecological impact

Collaborative control action

Integrate and enhance monitoring resources to build a comprehensive monitoring system for flood, drought, disaster prevention and mitigation
Strengthen the construction of early warning and forecasting capabilities and build a modern intelligent water network project
Establish and improve water and drought response regulations, and implement the most stringent river and lake space management





Thanks for your attention.

